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ELSEVIER
FULL-TEXT ARTICLE

Endotoxin and immune activation in chronic heart failure: a prospective cohort study.

Niebauer J, Volk HD, Kemp M, Dominguez M, Schumann RR, Rauchhaus M, Poole-Wilson PA, Coats AJ, Anker SD.

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BACKGROUND: Immune activation in patients with chronic heart failure may be secondary to endotoxin (lipopolysaccharide) action. We investigated the hypothesis that altered gut permeability with bacterial translocation and endotoxaemia would be increased in patients with oedema secondary to congestive heart failure. **METHODS:** We compared 20 patients who had chronic heart failure with recent-onset peripheral oedema (mean age 64 years [SD 10], New York Heart Association [NYHA] class 3.3 [0.7]), 20 stable non-oedematous patients with chronic heart failure (mean age 63 years [19], NYHA class 2.6 [0.7]), and 14 healthy volunteers (mean age 55 years [16]). Biochemical markers of endotoxaemia, inflammation, and immune activation were measured. Ten patients were studied within 1 week of complete resolution of oedema. Five patients survived longer than 6 months and were restudied again after remaining free of oedema for more than 3 months. **FINDINGS:** Mean endotoxin concentrations were higher in oedematous patients with chronic heart failure than in stable patients with chronic heart failure (0.74 [SD 0.45] vs 0.37 EU/mL [0.23], $p=0.0009$) and controls (0.46 EU/mL [0.21], $p=0.02$). Oedematous patients had the highest concentrations of several cytokines. After short-term diuretic treatment, endotoxin concentrations decreased from 0.84 EU/mL [0.49] to 0.45 EU/mL [0.21], $p<0.05$) but cytokines remained raised. After freedom of oedema for more than 3 months after oedema resolved, endotoxin concentrations remained unchanged from the previous visit (0.49 EU/mL [0.06], $p=0.45$). **INTERPRETATION:** Raised concentrations of endotoxin and cytokines are

found in patients with chronic heart failure during acute oedematous exacerbation. Intensified diuretic treatment can normalise endotoxin concentrations. Our preliminary findings suggest that endotoxin may trigger immune activation in patients with chronic heart failure during oedematous episodes.

PMID: 10359409 [PubMed - indexed for MEDLINE]

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